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ABSTRACT

Dale Hample's cognitive model of argument is designed to reflect the operation of syllogistic thought processes. It has been suggested however, that the model applies more closely to abstractly worded arguments than to concrete thinking and that it also may work better with more interested respondents because it seems to describe the central rather than the peripheral routes to persuasion. A study was conducted to examine these hypotheses. Subjects were 233 undergraduates enrolled in communication classes, half of whom were taking required public speaking courses, and half who were communication majors. Students read three experimental booklets, a control containing no message, and two--one abstract and one concrete--containing a "newspaper story" on the economy. Results indicated that both experimental conditions were about equally effective in stimulating belief change. The model, while adequate for concrete messages and relatively uninteresting topics, performed much better for abstract messages, interesting topics, and interested persons. The between-subject correlations gave exceptionally clear evidence for the model's validity, particularly for groups. (Tables of results are included.) (JL)

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DO CONCRETELY AND ABSTRACTLY WORDED ARGUMENTS REQUIRE DIFFERENT MODELS?

By

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Abstract

This paper reports results of further testing of Hample's cognitive model of argument. The model performed at the previous levels of accuracy when the usual within-subjects analyses were conducted. When group data were used, however, the model accounted for as much as 95% of variance in adherence to claims. The model also performed better for abstract than concrete materials, and better for highly involved than less involved respondents. Speculative explanations for these last two outcomes are offered.

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DO CONCRETELY AND ABSTRACTLY WORDED ARGUMENTS REQUIRE DIFFERENT MODELS?

In recent years, Hample has proposed and produced empirical evidence for a cognitive model of argument (e.g., Hample, 1981a; 1981b). This model is designed to reflect the operation of syllogistic thought processes. The probability that a person accepts an argument's claim--p(C)--is hypothesized to be determined by the probability values of two separate syllogisms. The first of these is the argument which the message is designed to stimulate. Equation (1) is the basic syllogistic expression:

$$(1) \quad p(C) = p(D)\ p(C|D).$$

The value of p(C) is predicted by the probability that D (the data) is true, multiplied by the probability that C is true given that D is true. Equation (1) will therefore generate one prediction of a person's estimate of the likelihood that C is true. That prediction may then be compared to the observed value for p(C).

Equation (1), however, is a naive model of argument because it presupposes that only the message's argument has any bearing on adherence to the claim. We may estimate the effects of arguments <u>other than</u> "D is true; C is true if D is true; so C is true" by means of equation (2):

$$(2) \quad p(C) = p(\bar{D})\ p(C|\bar{D}).$$

This equation gives us a different estimate of p(C), one which reflects the summary argument "D is false; C is true if D is false; so C is true." This summary argument is in fact not a specific argument at all, but instead serves as a surrogate for the whole cognitive context of the message-stimulate argument.

Since the two predictor arguments both affect p(C) at the same time, they need to be joined into one equation. Their relative influence varies from one situation to another, but can be empirically estimated in any given instance. Thus, each predictor is weighted by a least squares estimate of relevance to p(C) in equation (3):

$$(3)\quad p(C) = \beta_1\, p(D)\, p(C|D) + \beta_2\, p(\bar{D})\, p(C|\bar{D}).$$

Equation (3) is the model of argument Hample proposes. As its derivation indicates, its core is the conditional syllogism and its central assumption is that logic ought to be our basic model of thought.

Possibly, however, some important cognitive processes ought to be modeled differently. Paivio's (1971) work is especially suggestive. He argues that humans have two different information processing systems. One is specialized for verbal material. It handles strings of words, is very sensitive to order, operates sequentially and is therefore the mind's natural seat of logic. The other system is for visual information such as pictures or images. This cognitive modality is organic and perspectival, allowing people to "view" things in any order and encouraging logic-free associations. Concrete words are coded in both systems because they stimulate images. Processing in the imagic system is often easier, and is the spontaneous preference when dealing with concrete material (Dominowski & Gadlin, 1968; Groninger & Groninger, 1982). Concrete materials are so high in imagery that a distinction between those two variables is often difficult to make empirically (Paivio, Yuille & Madigan, 1968; Williams, 1979; but see Richardson, 1980).

On the basis of this work, Hample (in press) theorizes that persuaders can play on the tension between imagery and logic to make fallacies attractive. Recent research using categorical syllogisms showed that higher imagery made highly ambiguous problems having no negative premises harder to solve, but had the opposite effect on simpler problems with negatives (Hample, 1982). Though this latter paper speculates that concreteness may well have a facilitative effect on ease of syllogism solution, the empirical evidence is anything but simple to interpret. How far logic can go in modeling concrete thinking remains an open question.

The present paper is designed to explore this issue further by comparing the accuracy of equation (3) for both abstract and concrete messages. If the

model produces comparably accurate predictions of p(C) for either type of stimulus material, then a reasonable course for future research will be to use the model for abstract and concrete arguments. If the equation proves to be superior for abstractly worded arguments, however, we may need to generate a different model for concrete thinking, and to restrict our generalizations about this or any other logic-based theory.

This project also has two secondary aims. The first is to explore another possible restriction on the model. Petty and Cacioppo (1981; Petty, Cacioppo & Goldman, 1981) distinguish between central and peripheral routes to persuasion. The central route is typified by careful, conscious thinking about the arguments, while peripheral sources of influence are extrinsic factors such as credibility or attractiveness of the persuader. Petty and Cacioppo show that a person's topic involvement keys which route is taken: highly involved people are strongly influenced by arguments and are untouched by credibility, while the opposite is true of people less interested in the topic. Equation (3) seems at first glance to be a model of the central route. Peripheral variables, however, could express themselves as "other" beliefs (cf. McGuire, 1960), and function through $\beta_2\ p(\bar{D})\ p(C|\bar{D})$. Subjects in the present study reported their interest in the message topic, allowing a test of the hypothesis that the model works better with more interested respondents. If equation (3) does in fact describe only the central route to persuasion, its range will be more sharply restricted than the previous claims for it have implied.

The last objective of this paper is to test a possible solution to a consistent methodological problem in this type of research. Subjects give reports of their subjectively estimated probabilities that various statements are true. They do this by reponding to semantic differential scales bounded by LIKELY-UNLIKELY or some nearly synonymous bipolar pair. These single item scales have only marginal reliability. Cohen (1978), using 100 point scales, reports reliabilities of about .65 for the p(X) type of item and about .60 for the conditional statements. With

seven point scales, Hample (1975) found lower limits for the reliabilities of those kinds of questions to be about .50 and .40 respectively. Test-retest correlations using seven step scales were about .65 and .35 for the two types of items in another study (Hample, 1981b). Hample (1981b) dealt with this problem by reducing the data set in such a way as to exclude the least reliable subjects. This revision, which cost about a fifth of the sample, yielded new reliabilities of .70 and .55. Since both the revised and full data sets in that study produced the same pattern of results--except that overall predictions were slightly better for the reduced data set--the reliability problem seems to be one of noise, rather than of some unknown but systematic influence on responses. Even so, reduction of the data is an inefficient procedure and can never be quite free of the suspicion that it statistically biases results in some unknown way. Therefore, this paper uses a different solution to the problem of noise in the data. In addition to reporting the usual within-subjects multiple correlations to test (3), this experiment also uses grouped data. Details of the procedure will be given in the results section, but the basic idea is this: by using group means instead of individual responses to items, the within-subjects noise is filtered out. Though sample sizes for specific correlations are reduced radically, no data are lost or unused, and so results cannot be biased.

Method

Subjects were 233 undergraduates enrolled in various communications classes at the author's institution. 115 were from the university-required public speaking course, while the remainder were taking classes populated almost entirely by majors. Males and females were almost equally represented. About three quarters of the students were juniors or seniors.

Three versions of the experimental booklet were prepared, and were distributed randomly. The control version contained no message. The other two sets

of materials presented a "newspaper story" on the economy. For some respondents, the message contained several references to a specific student and his economic prospects and experiences. This was the concrete condition. In the abstract version, those references were deleted and replaced by more general references (e.g., "any student"). Both messages were about 400 words long.

All three versions of the booklet contained the same set of scales, which followed the message in the experimental conditions. The first ten items were seven point semantic differential scales bounded by VERY UNLIKELY and VERY LIKELY. These items measured $p(C)$, $p(D)$, $p(\bar{D})$, $p(C|D)$ and $p(C|\bar{D})$ for both the abstract and concrete messages. The abstract items were worded generally while the concrete ones referred to the specific student from the concrete story. Instructions mentioned that some items refer to "Bob Heiland, who is a typical undergraduate at Ohio State University." Students who read messages were also asked to rate their ease in forming images of the things in the article, the content's difficulty, its concreteness, the topic's importance and the credibility of the unnamed reporter who wrote the article. With the exception of these last five items, all students were asked to respond to all the questions.

Typical subjects took about 15 minutes to finish. Students were debriefed after handing in their booklets.

Results

Experimental and control groups differed significantly on adherence to both the abstract ($F=19.151$, $p<.001$) and concrete claims ($F=26.824$, $p<.001$), indicating that the messages were effective in stimulating belief change. The two experimental groups did not differ significantly on the claims, however, so the messages seem to have been equally effective (for the abstract claim, $F<1$; for the concrete claim, $F=2.841$, $p<.10$). The two experimental groups were also equivalent in their estimates of the messages' imageability, abstractness, importance, credibility of author (all Fs less than one) and difficulty ($F=1.711$,

$p<.15$). The failure of the subjects to confirm the concreteness induction is troublesome, and indicates that the manipulation was not very strong.

Results bearing most directly on the hypotheses may be found in Table 1. The first two columns report the usual within-subjects multiple correlations for

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INSERT TABLE 1 HERE

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the study's various conditions. Two kinds of evidence support the notion that equation (3) is better suited to abstract than to concrete materials. First, notice the contrast between the abstract and concrete message conditions. The model explains nearly half the variance in the abstract condition, but only about a quarter with a more concrete message. Secondly, the control subjects, who read no message, are only modeled adequately for the abstract items. The model ought to be as applicable to no message conditions (in which beliefs are presumably stable) as it is to message conditions (in which beliefs are more likely to be changing). In fact, equation (3) has always performed more poorly for no message conditions in the past. Here, however, performance is sufficient, but only in the case of the more abstract items. (As is well known [McGuire, 1960], the items on a questionnaire of this type have a persuasive effect of their own.)

The next two columns of Table 1 report the zero-order correlations for these same conditions. These correlations were calculated by dividing the sample into groups. All subjects responding "1" to the concrete claim constituted one concrete group, everyone choosing "2" was in a second group, and so on. In this way, seven groups were obtained for the concrete claim, and seven more for the abstract claim. For each group, mean values of the pertinent $p(D)\ p(C|D)$ and $p(\bar{D})\ p(C|\bar{D})$ terms were calculated. These means were multiplied by the B weights (not the standardized β weights, which of course are wrongly calibrated for this sort of procedure) from the multiple regressions reported earlier, and were then summed, yielding a predicted value for the claim. Predicted and observed

(i.e., selected) values for the claims were then correlated in the normal fashion. Results in Table 1 indicate that this procedure for filtering out noise due to random measurement error is highly effective. Explained group variance ranges from 98% to 45%. In the experimental groups, this range is 94% to 70%. This constitutes extremely strong support for the argument model. The results for r generally parallel those for R, except that the control group no longer shows any superiority for the abstract items. The control r's are the least stable of all those in the table, however; 4 of the 14 groups formed with control data had 3 or fewer subjects.

The last result of special interest is the comparison of students expressing high and low interest in the message topic. Subjects were classified according to their response to the importance item. The mean response on this seven item scale was 5.8, and fully 48% of all respondents chose "7" on the scale. In spite of this less than dramatic difference between high and low interest groups, however, Table 1 shows the model to be consistently better for the more involved students (i.e., those answering "7"). This suggests that the model's first relevance is for the central route to persuasion. The converse result--that source credibility ought to be more effective for the less interested subjects--did not appear. Credibility did not correlate significantly with claims for all subjects in either the high or low importance classifications. Possibly this result occurred because credibility was not manipulated in this design. The failure even to name a specific source may have made peripheral cues of this kind unusually inaccessible to less interested subjects.

Discussion

This study's results both confirm the general usefulness of equation (3) and suggest some limitations of it. The model, while adequate for concrete messages and relatively uninteresting topics, performs much better for abstract

messages and interesting topics. Given the theoretical bases from which these findings were expected, the results seem to specify some limits to argument, rather than merely to a particular model.

The logical model works better for abstract materials because people reason better (i.e., more logically) when they are thinking verbally. Whether nonverbal thinking ought to be called reasoning is an interesting question. Certainly spatial abilities are spontaneously called into play in some sorts of logical tasks (De Soto, London & Handel, 1965; Sternberg, 1980), and these nonverbal cognitive processes aid in problem solution. But on the other hand, mental events such as mental rotation of envisioned objects (Shepard & Chipman, 1970) or "looking" more closely at a mental image until it overflows the mind's "screen" (Kosslyn, 1980) seem to be much more like perception than reasoning. If we decide that the nonverbal component of some approaches to (say) linear syllogisms can be isolated from the stream of consciousness involved in working out the logical problem, then we may be able to distinguish between logical and imagic thought with some clarity. The declaration that we mean the former kind of information processing when we refer to "reasoning," and that the latter describes a less disciplined and therefore less specialized process, may turn out to be a plausible position. In short, equation (3) may not work as well for concrete materials because something besides argument may be going on.

This thesis is perhaps clearer in the case of involved versus uninvolved subjects. Petty and Cacioppo (1981) theorize that people attend more closely and critically to persuasive arguments when the topic is interesting; thus, more cognitive arguing and counterarguing take place (see Greenwald, 1968). Less ego-involved audience members are less likely to go to the cognitive effort of working through a complex argument, and hence are more vulnerable to peripheral cues that a claim is attractive or unattractive. Presumably the former kind of thinking is more like reasoning than the latter. But even credibility's peripheral

influence can be formed into an argument: "P is credible; I should believe credible people; therefore I believe P." One difference--perhaps the critical one--between such peripheral reasoning and central arguing is that one type is typically conscious and the other is not. We may wish to say that the more conscious a bit of reasoning is, the more centrality it has in forming beliefs. Whether consciousness causes centrality, or centrality stimulates consciousness, or whether these are really the same thing, is an open question.

Possibly the most dramatic and important result of this study is that the between-subjects correlations gave exceptionally clear evidence for the model's validity. The multiple R's reported in Table 1 are of about the usual size for tests of equation (3). They leave quite a lot of variance to be explained, however. This additional variance might have been accounted for by extraneous variables (source characteristics or message features, for instance) or by measurement error. The size of the zero-order correlations in Table 1 strongly supports the notion that the R's are depressed only by unreliability, and that equation (3) is a virtually complete description of cognitive argument. We ought to note carefully, however, that the multiple R's have a different predictive base than the r's. The multiple R's summarize the model's accuracy with individual subjects, while the r's reflect group responses. One implication of this is that the model is considerably more accurate for groups than for individuals. Another is that in the long run, we might be able to acheive similar levels of accuracy for a given individual if we have enough data on enough arguments. This follows from the conclusion that the measurement error is truly random: if it is, then it ought to be random within people just as it is within groups. Enough tests of enough arguments ought therefore to allow the mean measuring errors to approach zero, and to generate correlations in the range of .90 and above. Thus, we could describe the degree to which a person reasoned according to the model's specifications. However, this does not

mean that the model will ever be much better for an individual argument measured once; improvement in those predictions must await development of a much more reliable way of measuring subjective probabilities.

Conclusion

The cognitive model of argument performed well in this study, explaining as much as 95% of group variance. The model works better with abstract materials because people reason more logically with such stimuli. More highly involved subjects are more accurately modeled becasue they do more reasoning about the message topic.

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Table 1

Within- and Between-Subjects Tests of Equation (3)

and High v. Low Importance Predictions Within Subjects

	Within Subjects		Between Subjects		High Importance		Low Importance	
	R	df	r	$\bar{n}$[1]	R	df	R	df
Claim								
				All Data				
Concrete	.575***	2/213	.957***	32	.641***	2/73	.482***	2/75
Abstract	.615***	2/213	.989***	33	.780***	2/73	.486***	2/75
				Concrete Message				
Concrete	.534***	2/69	.838***	11	.669***	2/25	.534**	2/31
Abstract	.444***	2/69	.960***	11	.689***	2/25	.435*	2/31
				Abstract Message				
Concrete	.684***	2/76	.954***	12	.765***	2/32	.618***	2/31
Abstract	.689***	2/76	.969***	12	.800***	2/32	.667***	2/31
				No Message Controls				
Concrete	.345*	2/62	.826*	10	N.A.[2]		N.A.[2]	
Abstract	.549***	2/62	.674*	10				

[1]These are the mean sample sizes for the groups which generated the correlated values. The actual N for each Pearson correlation, of course, is 7. See the text for an explanation of this procedure.

[2]Control subjects were not asked to rate the importance of the message topics.

*p<.05

**p<.01

***p<.001